

REMARKS

In view of the above amendment, applicant believes the pending application is in condition for allowance.

The office action and prior art applied have been carefully reviewed.

New claims 58 and 59 have been added to the present application to further clarify the present invention. Claim 58 contains the limitations of the substantially non-amended claim 35 and the limitations of the amended claim 39. Claim 59 contains the limitations of the substantially non-amended claim 45 and the limitations of the amended claim 49.

Claims 56 and 57 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

In consideration of this rejection, the claims 56 and 57 have been amended to contain the feature of “an estimating unit (that) estimates a frequency offset between the transmitter and the receiver”. This feature is supported by descriptions at lines 15-17 of page 1 and lines 17-21 of page 7 and a phase error estimator 120 in the present specification.

Claims 35-38, 41, 42, 45-48, 51, 52 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wright (US Patent No. 5,809,083) in view of Kaku (US Patent No. 5,550,811).

In consideration of this rejection, the claims 35 and 45 have been amended to contain the feature of “a signal point of a pilot symbol on a signal constellation (that) has an amplitude larger than amplitudes of possible signal points of a first stream on the signal constellation”, and the feature of “the signal point of the pilot symbol (that) differs in phase from a particular signal point of the first stream having a maximum possible amplitude among the signal points of the first stream on the signal constellation”.

These features are supported by descriptions at lines 20-25 of page 2 and illustrations of Fig. 3, Fig.5, Fig. 6, Fig. 7 and Fig. 8.

Differences between the present invention defined by the amended claims 35 and 45 and the combination of Wright and Kaku are now described.

The present invention teaches a method of transmitting a digital data stream. In this method, a digital data stream is converted into a first stream of information symbols, and a pilot symbol is regularly inserted in the first stream to generate a second symbol stream. Then, a modulated version of the second symbol stream is transmitted by wireless. The pilot symbol has an amplitude larger than amplitudes of possible signal points on a signal constellation. Further, the pilot symbol differs in phase from a particular signal point of the first stream having a maximum possible amplitude among the signal points of the first stream on the signal constellation. Therefore, the pilot signal inserted into the first stream does not influence a peak power of the first stream.

In contrast, Wright discloses a differentially encoded pilot word system. In this system, a generator 412 generates differentially encoded pilot words, and an inserter 416 inserts the pilot words into a symbol stream (column 8, lines 14-21). Alternatively, an inserter 416' periodically inserts digital values corresponding to the pilot words. As shown in Fig. 1, the inserter 416' inserts the binary values 0011_2 and 1100_2 into the data stream (column 8, lines 28-40). The phases of the binary values 0011_2 and 1100_2 corresponding to the pilot words coincide with other binary values 0110 and 1001 of the symbol stream on the constellation, respectively.

Therefore, Wright fails to teach or even suggest the limitation of “a pilot symbol (that) differs in phase from a particular signal point of a first stream having a maximum possible amplitude among the signal points of the first stream on a signal constellation”.

Kaku discloses a sync acquisition and tracking circuit for a direct sequence spread spectrum (DS/CDMA) receiver. A transmitter (or cell-site station) of Kaku initially encodes a baseband downlink (cell-to-mobile) signal into an encoded signal at the chip rate much higher than the symbol rate, spreads the symbols of the encoded signal with PN (pseudo-random number) spreading sequences PN_i and PN_q commonly assigned to the service area, further spread with orthogonal Walsh codes uniquely assigned to the downlink channel, spreads a pilot

signal, which may be a series of all zeros or ones, at the same chip rate with the same PN sequences PN_i and PN_q with orthogonal Walsh all-zero codes, and combines the in-phase and quadrature components of spread spectrum downlink signal with the corresponding components of spread spectrum pilot signal to produce an I and a Q signal, which are modulated onto orthogonal radio-frequency carriers, amplified and transmitted (column 3, lines 1-17).

That is, a pilot signal is used for each symbol of the coded signal, and a spread pilot signal is combined with a corresponding spread symbol by means of an analog technique. Thus, what the present invention calls a “pilot symbol” and what Kaku calls a “pilot signal” are quite different from each other.

Further, although a pilot symbol is regularly inserted in a first stream according to the present invention, the spread pilot signal of Kaku is not inserted into spread symbols of an encoded signal but is combined with a corresponding spread symbol.

Moreover, Kaku discloses as follows. As shown in Fig. 3, the amplitude of the pilot signal is usually much higher than that of the data signal, and a difference $\Delta\theta$ between the phases θ_p and θ_d is negligible as compared with the phases θ_p and θ_d (column 4, lines 32-37). That is, the phase θ_p of the pilot signal is substantially the same as the phase θ_d of the data signal.

Therefore, Kaku fails to teach or even suggest the limitation of “a pilot symbol (that) differs in phase from a particular signal point of a first stream having a maximum possible amplitude among the signal points of the first stream on a signal constellation”.

The Examiner states that claims 39 and 49 would be allowable if written in independent form including all of the limitations of the base claim and any intervening claims.

In response to this statement, claim 58 containing the limitations of claim 39 and claim 58 containing the limitations of claim 49 have been added.

For the above reasons, the amended claims 35 and 45 and the added claims 58 and 59 are clearly distinguishable from the teachings of Wright even taken in combination with Kaku, and thus, the rejection under 35 U.S.C. 103(a) should now be withdrawn.

In view of the above, consideration and allowance are, therefore, respectfully solicited.

In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

The Director is hereby authorized to charge any fees, or credit any overpayment, associated with this communication, including any extension fees, to CBLH Deposit Account No. 22-0185, under Order No. 20402-00579-US2 from which the undersigned is authorized to draw.

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Respectfully submitted,

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